REMARKS

This amendment is submitted in response to the Final Office Action mailed June 3, 2009, and follows the November 10, 2009 interview with the Examiner, which is gratefully acknowledged. In view of the above claim amendments and the following remarks, reconsideration by the Examiner and allowance of the claims are respectfully requested.

Applicants have amended claims 1 and 15 and added new claims 20 – 24. Claims 1, 3, 4 and 11 – 24 are currently pending. Claims 2 and 5 – 10 are cancelled.

Claims 1 and 15 are amended to more particularly point out and distinctly claim the subject matter applicants regard as the invention. Specifically, claims 1 and 15 are amended to more distinctly claim that the polycarbonate (PC) has the melt flow of injection molding grade PC and the mixture of acrylonitrile-butadiene-styrene (ABS) and PC has the melt flow of injection molding grade mixtures of ABS and PC. The use of injection molding grade PC is disclosed in the PCT specification at least at page 4, line 27. The use of injection molding grade ABS is disclosed in the PCT specification at least from page 4, line 30 to page 5, line 14 wherein articles injection molded from ABS are disclosed, from which the ABS is recycled for use in the presently claimed invention. The amendments to claims 1 and 15 therefore do not introduce new matter.

The use of the recycled materials of new claims 21 and 22 is disclosed in the PCT specification at least on page 4, lines 6 – 9; page 4, lines 20 – 23, and p. 5, lines 8 – 16. The blend of new claim 23 is disclosed in the PCT specification at least at page 4, lines 7 – 9, from page 4, line 30 to page 5, line 14, on page 11, line 25, and in FIG. 3 and the description thereof in the specification. The blend of new claim 24 is disclosed in the PCT specification at least at page 4, lines 7 – 9, at page 4, line 27, from page 4, line 30 to page 5, line 14, at page 11, line 25, and in FIGS. 4 and 5 and the descriptions thereof in the specification. Accordingly, no new matter was added by new claims 22 – 24. Instead, the amendments and new claims narrow the scope of the claims by limiting the melt flow of the HDPE used in the present invention to a narrower range within the scope of the subject matter of the previously pending claims.

For reasons which are submitted below, the claims are believed to be in condition for allowance. The claim amendments and new claims are believed to resolve the concerns raised by the Examiner. Accordingly, reconsideration is respectfully requested

Turning to the Office Action, claims 1, 3, 4, 7–9 and 11–19 are rejected under 35 U.S.C. §112 first paragraph, as failing to comply with the written description requirement. Specifically, the Office Action alleges that "[f]igure 5 shows a small portion of the composition range barely meeting applicants requirements [and] those skilled in the art would not assume that applicants were in possession of the concept of compositions having applicants "additive contribution" characteristic for other melt flow rates besides those associated with the materials of Figure 5." The Examiner questioned whether a blend of HDPE with a melt flow of 0.9 and PC with a melt flow of 1.1 have a modulus greater than the additive contribution of each polymer to overall stiffness. The Office Action concludes that Applicants' combination of limitations regarding melt flow, concentrations and "additive contribution" are new matter. This rejection is respectfully traversed in view of the above claim amendments and new claims for the following reasons.

At the interview, Applicants proposed limiting the HDPE to bottle grade HDPE because this grade has a melt flow significantly below 1g/10 min at 190°C/2.16 Kg and because this was also the HDPE grade used in the Examples and the Drawing Figures. Applicants similarly proposed limiting the PC and ABS to injection molding grade because this grade has a melt flow above 1/g10 min at 190°C/2.16 Kg and was also the grade of PC and ABS used in the Examples and the Drawing Figures. Applicants explained that it was the difference in melt flow rates that produced the unexpected results and that the melt flow rates between bottle grade HDPE and injection molding grade PC and/or ABS was sufficient to produce the unexpected results shown in FIGS. 3 – 5 within the depicted blending ranges. The Examiner questioned whether all bottle grade HDPE and injection molding grade PC and ABS possessed the melt flow rate needed to provide the unexpected results, and requested evidence in support of this argument.

Accordingly, Applicants have amended claims 1 and 15 to specify that the polycarbonate (PC) has the melt flow of injection molding grade PC and the mixture of acrylonitrile-butadiene-styrene (ABS) and PC has the melt flow of injection molding grade mixtures of ABS and PC.

New claim 23 requires the ABS to have the melt flow of injection molding grade ABS. Support for the use of injection molding grade PC is found at the PCT specification at page 4, line 27:

> Injection molding grades of PC are preferred.

Support for the use of injection molding grade ABS is disclosed in the PCT specification at page 4, line 30 to page 5, line 14:

> ABS is an engineering plastic used in automobile body parts and for fittings in telephones, bottles, heels, luggage, packaging, refrigerator door linings, plastic pipes, building panels, shower stalls, boats, radiator grills and housings for electronics equipment and business machines including consumer electronics. Most ABS resins are true graft polymers consisting of an elastomeric polybutadiene or rubber phase, grafted with styrene and acrylonitrile monomers for compatibility, dispersed in a rigid styrene-acrylonitrile matrix. However, mechanical poly-blends of elastomers and rigid copolymers are also available. Virgin ABS resin may be used in accordance with the present invention. ABS is somewhat expensive when supplied in its purest form. For this reason, recyclable sources of this polymer are preferred for use in the present invention. ABS is extensively used in the manufacture of inexpensive, durable products. It is a primary material in the manufacture of products such as computer housings, computer monitor housings, televisions and automobile components.

The foregoing describes articles known to one of ordinary skill in the art to be injection molded from ABS.

A person with ordinary skill in the art at the time the instant invention was made understood the term "injection molding grade" with respect to PC and/or ABS to refer to materials having certain melt flow rates and other standard physical characteristics. See Appendix Exhibit A, Practical Injection Molding (Olmsted and Davis, Eds., Marcel Dekker, Inc., New York 2001) at page 14, wherein a melt index in the range of 2 to 12 is disclosed in the context of injection molding of plastics. Applicants have not amended the claims to require that the HDPE have a melt flow rate of bottle grade materials because the recited melt flow rate defines bottle grade material. See, Appendix Exhibit B, Lee, Understanding Blow Molding, (Hanser Gardner Publications, Cincinnati 2000) at the bottom of page 103, wherein a melt index

in the range of 0.7 to 1 is disclosed for HDPE to be formed into milk, beverage and food containers.[1]

The specification discloses, and the Examples (with reference to FIGS. 3– 5) demonstrate, that blends of HDPE having a melt flow at 190°C/2.16 Kg less than 1g/10 min with injection molding grade PC and/or ABS, have the properties disclosed in FIGS. 3 – 5. It is well-settled that there is no *in haec verba* requirement and claim limitations may be supported through implicit or inherent disclosure. As evidenced by Exhibits A and B, the range of melt flow rates of these grades of HDPE, PC, ABS and mixtures of PC and ABS fall within the disclosed range of melt flow rates for the two polymer phases, namely the melt flow rate of less than 1 g/10 min at 190 °C/2.16 Kg for HDPE and the melt flow rate of greater than 1 g/10 min at 190 °C/2.16 Kg for PC and ABS/PC mixture. The examples disclose physical properties of blends of bottle grade HDPE with PC, ABS and mixtures thereof obtained from recycled injection molded articles, from which modulus data is presented in FIGS. 3 – 5.

The claimed blends have a modulus greater than the additive contribution of each polymer to overall stiffness due to the melt flow rate differences between the polymers in the claimed blends. The instant specification and Exhibits A and B make it clear that the HDPE used has a fractional melt flow, i.e. below 1.0 gm/ 10 min, while the injection molding grades of PC, ABS, and mixtures thereof have melt flow rates that are significantly above 1.0 gm/ 10 gm. This difference in melt flow rates produces the unexpected results depicted in FIGS. 3-5 within the depicted ratio ranges to which the claims are directed.

The pending claims have been amended and new claims 23 and 24 presented with limitations narrowing the claims to precisely what is depicted in FIGS. 3 – 5, i.e., HDPE with a melt flow melt flow below 1.0 g/ 10 min blended with PC and/or ABS with the melt flow of injection molding grades of these polymers, at ratios of HDPE to PC and/or ABS within which the blend has a modulus greater than the additive contribution of each polymer to overall stiffness. Because the claims are limited to the ratios of the polymer grades producing

1 These publication is submitted merely as evidence that viscosities of bottle grade HDPE and injection molding grade PC and/or ABS were well known as of the filing date of the present application. For this reason Applicants have not cited these publications in an Information Disclosure Statement, nor have the publications been listed on a Form PTO-1449 (See MPEP §609.05(c).

the disclosed results in a manner consistent with the description in the specification in the context of that which is known to those of ordinary skill in the art, which includes the drawing figures, the written description requirement is satisfied. That is, one of ordinary skill in the art at the time the invention was made would have understood that Applicants were fully in possession of the invention as presently claimed.

Therefore, by amending Claims 1 and 15 to limit the claims to melt flow grades of polymers used to generate the data for the Examples and drawing figures, the rejection of remaining claims 1, 3, 4 and 11 – 19 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement has thus been overcome. New claims 20 – 24 also implicitly and expressly contain these limitations. Reconsideration by the Examiner and withdrawal of the written description rejection of claims 1, 3, 4 and 11 – 19, and favorable consideration and allowance of new claims 20 – 24 is therefore respectfully requested.

Accordingly, in view of the above claim amendments and the foregoing remarks, this application is now in condition for allowance. Reconsideration is respectfully requested. However, the Examiner is requested to telephone the undersigned if there are any remaining issues in this application to be resolved.

Finally, if there are any additional charges in connection with this response, the Examiner is authorized to charge Applicant's deposit account number 50-1943 therefor.

Date: December 3, 2009

Respectfully submitted

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APPENDIX

Applicant: T. Nosker
Application No. 10/501,701

Docket No. 70439.00026

EXHIBIT A

y Gabriel O. Shonaike and George P.

dited by Munmaya K. Mishra and Shi-

ted by Samuel L. Belcher
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rolongo, Rosa M. Masegosa, and Cat-

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In Preparation

PRACTICAL INJECTION MOLDING

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Foreword

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have a maximum limiting shear rate, beyond which they will degrade [7].

2.4.4 Viscosity (Melt Index)

Another property of both crystalline and amorphous materials that affects the molding process is ***viscosity***. Viscosity may be defined as the resistance of a fluid to flow. In other words, **if a melted plastic is considered viscous, it is thick (like molasses) and will not flow easily.** The viscosity of a melted plastic can be measured and given a rating called a **Melt Index (MI)**. **A high melt index means that the melted plastic is thin and watery (and has a low viscosity)**. The lower the melt index, the more thick and viscous the melt is and the less easily it will flow. The melt index of plastics range from a fractional MI, meaning that it is less than one (1), to more than a hundred (100). Most common materials have a MI in the range of 2 to 12. There are various test methods and parameters for measuring Melt Index. When comparing materials, it is important that the method and parameters are the same.

The viscosity of a plastic is important to the molder. **Materials with a very high MI or very low viscosity are more difficult to push or inject** and, in some cases, more difficult to mold. Incidentally, it is good to remember that **Melt Index is also a measure of molecular weight.** A higher MI indicates a lower molecular weight for a given polymer family. This will also be discussed further in later chapters.

<u>*CASE STUDY NO. 1:* **Check New Materials**</u>

In the study of plastic materials, it is important that the reader become aware that the *same material from two different manufacturers may not process alike*. In fact, *two lots of the same material from the same source may not process alike.*

An example follows: A very large user of a fairly common material, high density polyethylene (HDPE), purchased a rail car of the identical grade of HDPE they had been using from a second source and unloaded the

EXHIBIT B

Norman C. Lee

Understanding Blow Molding

HANSER

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Hanser Gardner Publications, Inc., Cincinnati

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of the MWD spectrum. This increased proportion of shorter, linear molecules acts as a lubricant. The ratio of HLMI/MI may thus be used as a guide in rating MWD; the higher ratio always indicates a broader distribution.

The melting and pumping actions of the extrusion process, maintained by heat and pressure, act on the resin via two rheological mechanisms: viscous and elastic. Viscous energy is dissipated through working against the resistance of the system while elastic energy is stored. This stored component causes an overall swell in the extruded parison.

The capacity of a molten HDPE to undergo elastic deformation, and hence store energy, increases as MWD broadens, especially with an increased proportion of larger molecules at the high end of the MWD spectrum.

Melt Swell

The swell effect, as already noted, is induced by the recovery of stored energy in melt elastically. Melt swell, rather than exact die and mandrel dimensions, establishes the final dimensions (both diameter and wall thickness) of the parison. Control of swell, by resin selection or rheology, and swell prediction are essential in precision blow molding operations.

Data on melt swell can be developed using laboratory instruments such as the Melt Indexer (ASTM D1238) and employing different weights in the 2,160 to 21,600 g range. The gas rheometer used in the CIF Flow Index Method, and the Instron Melt Rheometer can provide guidance in predicting melt swell characteristics at temperatures and shear conditions matching those experienced on commercial blow molding equipment. Basic differences in the L/D ratios of the rheometer orifice and equivalent conditions of the parison tooling must be taken into account in developing such comparative data.

The swell ratio (the extrudate diameter divided by the orifice diameter) increases with shear rate. Some resins tend to level off in swell in certain ranges of shear rate, while for others swell continues to increase as shear rate increases. The former types provide better parison dimension control and are preferred. The differences in die configuration between the round orifice of a rheometer and the annulus gap of blow molding tooling are important factors in making comparisons between melt swell and rheological conditions.

Resin Types

HDPE resins used in extrusion blow molding fall into five general categories:

1. Rigid homopolymers (0.960 ± 0.002 g/cm^3 range) for thin wall milk, beverage, and food containers. Melt indexes are typically in the 0.7 to 1.00 range.
2. Dual purpose copolymers (0.955 ± 0.002 g/cm^3 range) for general purpose chemicals, bleaches, cleaners, automotive products, etc. These provide moderate toughness and environmental stress crack resistance (ESCR). Typical MIs are in the 0.2-0.4 range.